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Please find below and/or attached an Office communication concerning this application or proceeding.

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/812,347
Filing Date: March 30, 2004
Appellant(s): HIGUCHI ET AL.

MAILED
JUN 14 2007
GROUP 1700

E. Rico Hernandez
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed March 7, 2007 appealing from the Office action mailed June 7, 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

20040185583	TOMMOYASU et al.	9-2004
20040097047	NATZLE et al.	5-2004
20040099377	NEWTON et al.	5-2004
20040241981	DORIS et al.	12-2004

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-22 and 24-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tomoyasu et al. (US 2004/0185583; hereinafter "Tomoyasu").

In a method for chemical oxide removal, Tomoyasu (abstract; ([0007], [0059],[0074], [0200]; Fig. 2) teaches that a chemical oxide removal process may be performed using a process recipe including setting an amount of a first reactant , a second reactant such as NH_3, HF, H_2, O_2, CO, CO_2, Ar, He, see [0200]. Hence, it would have been obvious to one with ordinary skill in the art to **use these gases and combinations thereof** . Tomoyasu [0007, lines 4-5] teaches setting an amount of an inert gas in order to achieve the trim amount. Tomoyasu teaches that the feature may be chemically treated by exposing the substrate to the process recipe and substantially removing the trim amount from the feature. Tomoyasu [0007] teaches the claimed variable parameters (setting a pressure, setting a temperature of substrate, setting a time period, setting a temperature of the process). Tomoyasu teaches changing flow rates of chemical treatment gases (e.g., gas flow rates of HF, NH_3, or inert gas). Tomoyasu also teaches thermally treating the substrate and rinsing the substrate following the chemical treating. Tomoyasu ([0007], [0074]) teaches adjusting the amount of inert gas (gas flow rate) in order to remove the desired amount of the chemical oxide. Tomoyasu teaches using charts, and various models for analysis, therefore, hence, it would have been obvious to one with ordinary skill in the art to use curve fitting and polynomial expressions (claims 1, 12, 24-26) to determine the relationship. Tomoyasu clearly shows that process parameters and composition of chemical treatment gases are result-effective variables. The process of conducting

routine experimentations so as to produce an expected result is obvious to one of ordinary skill in the art. In the absence of showing criticality or new, unexpected results, a person having ordinary skill in the art would have found it obvious to modify the prior art by performing routine experiments (by using different process parameters and compositions) to obtain optimal result with a reasonable expectation of success. As such, the relationship between a trim amount of the feature and an amount of an inert gas. The relationship may be established for an amount of first process gas, and an amount of first process may be determined.

Changes in compositions, temperature, concentrations, or other process conditions of a process do not impart patentability unless the recited ranges are critical (i.e., they produce a new and unexpected result that differs in kind and not merely in degree from the result of the prior art). In re Woodruff, 16USPQ2d 1934,1936 (Fed. Cir.1990); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809; In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). MPEP 2144.05 II.

" It is prima facie obvious to use two compositions, each of which is taught by the prior art to be useful for the same purpose. " In re Kerkhoven 205 USPQ 1069 (CCPA 1980). In re Susi 169 USPQ 423, 426 (CCPA 1971). See also Ex parte Quadranti 25 USPQ 2d 1071 (BPAI 1992).

As to dependent claims 11 and 21, see [0062].

As to dependent claim 22, Tomoyasu ([0007], [0074]) teaches adjusting the amount of inert gas (gas flow rate) in order to remove the desired amount of the chemical oxide, therefore, it is considered to read on claimed limitation.

The instant claims (claims 27 and 28) differ from Tomoyasu by specifying using the curve fitting including multiple regimes and using separate mass flow controller. However, Tomoyasu teaches using flow controller for the process gas. Using one controller or multiple controllers for the process is merely a matter of choices of engineering depending on product requirement, in the absence of unexpected result, it

would have been obvious to one with ordinary skill in the art to choose one or the other depending on the product requirement and quality criteria of the product.

Claims 1, 4-8, 10-12, 15-19, 21,22, and 24-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Newton et al. (US 2004/0099377; hereinafter "Newton").

In a method for chemical oxide removal, Newton (abstract; ([0026], [0033], [0057], [0073],[0074]), teaches that a chemical oxide removal process may be performed using a process recipe including setting an amount of a first reactant , a second reactant. Newton teaches setting an amount of an inert gas in order to achieve the trim amount. Newton teaches that the feature may be chemically treated by exposing the substrate to the process recipe and substantially removing the trim amount from the feature. Newton teaches the claimed variable parameters (setting a pressure, setting a temperature of substrate and setting a temperature of the process). Newton teaches changing process chemical treatment gas flow rates (e.g., gas flow rates of HF, NH_3, or inert gas). As such, it would have been obvious to one with ordinary skilled in the art to determine the relationship between a trim amount of the feature and an amount of an inert gas. The relationship may be established for an amount of first process gas, and an amount of first process gas. The trim amount may be achieved by using the relationship. After gathering information of etching rates, thickness (trim amount), and process parameters, it would have been obvious to one with ordinary skill in the art to tabulate / extrapolate / manipulate data and perform calculation using common engineering and statistical methods (such as regression, extrapolation, best-fit,

polynomial, least squares, interpolation) and numerical analysis to optimize the relationship and minimize the error as instantly claimed (e.g., claims 1, 12, 24-26). Newton clearly shows that process parameters and composition of chemical treatment gases are result-effective variables. The process of conducting routine experimentations so as to produce an expected result is obvious to one of ordinary skill in the art. In the absence of showing criticality or new, unexpected results, a person having ordinary skill in the art would have found it obvious to modify the prior art by performing routine experiments (by using different process parameters and compositions) to obtain optimal result with a reasonable expectation of success.

> **Changes in compositions, temperature, concentrations, or other process conditions of a process do not impart patentability unless the recited ranges are critical (i.e., they produce a new and unexpected result that differs in kind and not merely in degree from the result of the prior art). *In re Woodruff*, 16USPQ2d 1934,1936 (Fed. Cir.1990); *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). MPEP 2144.05 II.**

Claims 27 and 28 differ from prior art by specifying using the curve fitting including multiple regimes and using separate mass flow controller. However, Newton teaches using flow controller for the process gas. Using one controller or multiple controllers for the process is merely a matter of choices of engineering depending on product requirement, in the absence of unexpected result, it would have been obvious to one with ordinary skill in the art to choose one or the other depending on the product requirement and quality criteria of the product.

Claims 1, 4-12, and 15-22, and 24-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Natzle et al. (US 2004/0097047; hereinafter "Natzle") in view of Newton et al. (US 2004/0099377; hereinafter "Newton").

In a method for chemical oxide removal, Natzle ([0014], [0037],[0038], [0042]-[0044]) teaches that a chemical oxide removal process may be performed using a process recipe including setting an amount of a first process gas and an amount of a second process gas. Natzle [0042] teaches acquiring data as a function of variable parameters (such as temperature, composition, residence time, pressure of the process gas, the amount of reactant or the rate of process gas), **all of which can be regulated.** Natzle teaches that the feature may be chemically treated by exposing the substrate to the process recipe and substantially removing the trim amount from the feature. Natzle [0042] also discloses that the aforementioned variable parameters influence the amount removed.

The claimed invention differs from Natzle by specifying well-known feature of adding inert gas (argon) to the process gas. Newton ([0073][0074]) is relied on to show this feature. Hence, It would have found it obvious to incorporate inert gas to same in order to provide more uniform and stable etching with a reasonable expectation of success. As such, the adjustment of variable parameters discussed in Natzle is applicable in the combined Natzle and Newton. Thus, it would have been obvious to one with ordinary skilled in the art to determine the relationship between a trim amount of the feature and an amount of an inert gas. The relationship may be established for an amount of first process gas, and an amount of first process gas. The trim amount may be achieved by using the relationship.

As to dependent claim 11 and 21, see [0014].

After gathering information of etching rates, thickness (trim amount), and process parameters, it would have been obvious to one with ordinary skill in the art to tabulate / extrapolate / manipulate data and perform calculation using common engineering and statistical methods (such as regression, extrapolation, best-fit, polynomial, least squares, interpolation) and numerical analysis (e.g., claims 1, 12, and 24-26). Claims 27 and 28 differ from prior art by specifying using the curve fitting including multiple regimes and using separate mass flow controller. However, prior art teaches using flow controller for the process gas. Using one controller or multiple controllers for the process is merely a matter of choices of engineering depending on product requirement, in the absence of unexpected result, it would have been obvious to one with ordinary skill in the art to choose one or the other depending on the product requirement and quality criteria of the product.

Claims 2, 3, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Natzle and Newton as applied to claims 1 and 12 above, and further in view of Doris et al. (US 2004/0241981; hereinafter "Doris").

The discussion of modified Natzle and Newton from above is repeated here.

Natzle and Newton are silent about the heating and rinsing with water after the chemical treating. In a method for chemical oxide removing, Doris teaches heating and rinsing with water after the chemical treating so as to efficiently remove the solid reaction product, see [0046]. Hence, it would have been obvious to one with ordinary skill in the art to modify Natzle and Newton by heating and rinsing with water as taught by Doris in order to efficiently remove the solid reaction product.

(10) Response to Argument

Appellant has argued that prior art does not teach the relationship is established for an amount of a first process gas, and an amount of a second process gas, nor does prior art teach determining the relationship between a trim amount of the feature and an amount of an inert gas using curve-fitting. It is not persuasive. As has been stated in the office action, prior art clearly shows that process parameters and composition of chemical treatment gases are result-effective variables. The process of conducting routine experimentations so as to produce an expected result is obvious to one of ordinary skill in the art. In the absence of showing criticality or new, unexpected results, a person having ordinary skill in the art would have found it obvious to modify the prior art by performing routine experiments (by using different process parameters and compositions) to obtain optimal result with a reasonable expectation of success. As such, the relationship between a trim amount of the feature and an amount of an inert gas. The relationship may be established for an amount of a first process gas, and an amount of a second process may be determined. Tomoyasu teaches using charts, and various models for analysis, therefore, hence, it would have been obvious to one with ordinary skill in the art to use curve fitting and polynomial expressions to determine the relationship.

Changes in compositions, temperature, concentrations, or other process conditions of a process do not impart patentability unless the recited ranges are critical (i.e., they produce a new and unexpected result that differs in kind and not merely in degree from the result of the prior art). *In re Woodruff*, 16USPQ2d 1934,1936 (Fed. Cir.1990); *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). MPEP 2144.05 II.

Appellant has argued that prior art does not teach adjusting the process recipe by setting an amount of argon, the amount of HF, and NH_3. It is not persuasive. As has

been stated in the office action, Tomoyasu (abstract; ([0007], [0059],[0074], [0200]; Fig. 2) teaches that a chemical oxide removal process may be performed using a process recipe including setting an amount of a first reactant , a second reactant such as NH_3, HF, H_2, O_2, CO, CO_2, Ar, He, see [0200]. Hence, it would have been obvious to one with ordinary skill in the art to use these gases and combinations thereof . Tomoyasu [0007] also teaches the claimed variable parameters (setting a pressure, setting a temperature of substrate, setting a time period, setting a temperature of the process). Tomoyasu teaches changing flow rates of chemical treatment gases (e.g., gas flow rates of HF, NH_3, or inert gas). Natzle [0042] also teaches acquiring data as a function of variable parameters (such as temperature, composition, residence time, pressure of the process gas, the amount of reactant or the rate of process gas), **all of which can be regulated.**

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Kin-Chan Chen
Primary Examiner
Art Unit 1765

May 21, 2007

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